IN THE CLAIMS:

1   1. (Currently Amended) A method for a storage operating system implemented in a

2   storage system to concurrently perform readahead operations for a plurality of different

3   read streams established in one or more files, directories, vdisks or luns stored in the

4   storage system, the method comprising:

5   allocating at least one readset data structure ("readset") for each of the one or

6   more files, directories, vdisks or luns in which the plurality of different read streams is

7   established, wherein the number of readsets allocated for each file, directory, vdisk or lun

8   depends on the size of that file, directory, vdisk or lun;

9   receiving a client read request at the storage system, the client read request

10   indicating client-requested data for the storage operating system to retrieve from a file,

11   directory, vdisk or lun stored in the storage system;

12   determining whether the received client read request matches any of a the

13   plurality of ~~readset data structures ("~~readsets~~")~~ allocated for the file, directory, vdisk or

14   lun containing the client-requested data; and

15   performing readahead operations in accordance with a set of readahead metadata

16   stored in an associated readset that is determined to match the received client read

17   request, wherein the readahead metadata describes the associated readset.

1   2. (Currently Amended) The method of claim 1, further comprising:

2   ~~allocating at least one readset for each of the one or more files, directories, vdisks~~

3   ~~or luns in which the plurality of different read streams is established;~~

4   generating a separate set of readahead metadata for each of the plurality of

5   different read streams; and

6   storing each generated set of readahead metadata in a different readset allocated

7   for the file, directory, vdisk or lun in which the read stream associated with the generated

8   set of readahead metadata is established.

1   3. (Original)   The method of claim 1, further comprising:

2   initializing each allocated readset to store a predetermined set of values.

1   4. (Cancelled)

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1   5. (Currently Amended) The method of claim ~~4~~ 2, wherein the number of readsets

2   allocated for a file, directory, vdisk or lun is dynamically increased as the size of that file,

3   directory, vdisk or lun is increased.

1   6. (Original) The method of claim 1, wherein a first readset is determined to match the

2   received client read request if the first readset stores a set of readahead metadata

3   associated with a read stream that is extended by the client-requested data.

1   7. (Original) The method of claim 1, wherein a second readset is determined to match

2   the received client read request when the client-requested data is located within a

3   predetermined fuzzy range associated with the second readset.

1   8. (Original) The method of claim 7, wherein the fuzzy range is derived based on a

2   multiple of a number of client-requested data blocks specified in the received client read

3   request.

1   9. (Original) The method of claim 7, wherein the fuzzy range extends in both a forward

2   direction and a backward direction in relation to a last data block retrieved in a read

3   stream associated with the second readset.

1   10. (Original)   The method of claim 1, wherein a third readset is determined to

2   match the received client read request if the third readset is determined to be unused.

1   11. (Original) The method of claim 10, wherein the third readset is determined to be

2   unused when a level value stored in the third readset equals a special indicator value.

1   12. (Original) The method of claim 1, wherein readahead operations are not performed if

2   the storage operating system determines that the file, directory, vdisk or lun containing

3   the client-requested data is accessed using a random access style.

1   13. (Original)   The method of claim 12, wherein a DAFS cache hint included in

2   the received client read request indicates that the file, directory, vdisk or lun containing

3   the client-requested data is accessed using a random access style.

1   14. (Original)   The method of claim 1, wherein readahead operations are not

2   performed unless:

3   (i)   a readset is determined to match the received client read request; and

4   (ii)   the matching readset stores a set of readahead metadata associated

5   with a read stream that is extended by the client-requested data past a

6   predetermined data block or memory address.

1   15. (Original)   The method of claim 1, further comprising:

2   if the received client read request does not match any of the readsets allocated for

3   the file, directory, vdisk or lun containing the client-requested data, then performing the

4   steps:

5   identifying the received client read request as being the first read

6   request in a new read stream;

7   generating a set of readahead metadata associated with the new

8   read stream;

9   selecting for reuse one of the readsets allocated for the file,

10   directory, vdisk or lun containing the client-requested data; and

11   storing the generated set of readahead metadata associated with the

12   new read stream in the readset selected for reuse.

1   16. (Original) The method of claim 15, wherein the readset selected for reuse stores a

2   level value that is less than or equal to level values stored in each of the other readsets

3   associated with the file, directory, vdisk or lun containing the client-requested data.

1   17. (Original) The method of claim 1, wherein the client read request received at the

2   storage system is a file-based client read request.

1   18. (Original)   The method of claim 1, wherein the client read request received at

2   the storage system is a block-based client read request.

1   19-28   (Cancelled)

1   29. (Currently Amended) A storage system that employs a storage operating system to

2   concurrently perform readahead operations for a plurality of different read streams

3   established in one or more files, directories, vdisks or luns stored in the storage system,

4   the ~~method~~ storage system comprising:

5   means for allocating at least one readset data structure ("readset") for each of the

6   one or more files, directories, vdisks or luns in which the plurality of different read

7   streams is established, wherein the number of readsets allocated for each file, directory,

8   vdisk or lun depends on the size of that file, directory, vdisk or lun;

9   means for receiving a client read request at the storage system, the client read

10   request indicating client-requested data for the storage operating system to retrieve from a

11   file, directory, vdisk or lun stored in the storage system;

12   means for determining whether the received client read request matches any of ~~a~~

13   the plurality of ~~readset data structures ("~~readsets~~")~~ allocated for the file, directory, vdisk

14   or lun containing the client-requested data; and

15   means for performing readahead operations in accordance with a set of readahead

16   metadata stored in an associated readset that is determined to match the received client

17   read request, wherein the readahead metadata describes the associated readset.

1   30. (Currently Amended) A computer-readable media comprising instructions for

2   execution in a processor for the practice of a method for a storage operating system

3   implemented in a storage system to concurrently perform readahead operations for a

4   plurality of different read streams established in one or more files, directories, vdisks or

5   luns stored in the storage system, the method comprising:

6   allocating at least one readset data structure ("readset") for each of the one or

7   more files, directories, vdisks or luns in which the plurality of different read streams is

8   established, wherein the number of readsets allocated for each file, directory, vdisk or lun

9   depends on the size of that file, directory, vdisk or lun;

10   receiving a client read request at the storage system, the client read request

11   indicating client-requested data for the storage operating system to retrieve from a file,

12   directory, vdisk or lun stored in the storage system;

13   determining whether the received client read request matches any of a~~a~~ the

14   plurality of ~~readset data structures ("readsets")~~ allocated for the file, directory, vdisk or

15   lun containing the client-requested data; and

16   performing readahead operations in accordance with a set of readahead metadata

17   stored in an associated readset that is determined to match the received client read

18   request, wherein the readahead metadata describes the associated readset.

1   Please add new claims 31 *et al.*

1   31. (New) A method for a storage operating system implemented in a storage system to
2   concurrently perform readahead operations for a plurality of different read streams
3   established in one or more files stored in the storage system, comprising:
4   allocating at least one read ser data structure ("readset") for each of the one or
5   more files, directories, vdisks or luns in which the plurality of different read streams is
6   established wherein the number of readsets allocated for each file depends on the size of
7   that file;
8   generating a separate set of readahead metadata for each of the plurality of
9   different read streams; and
10   storing each generated set of readahead metadata in a different readset allocated
11 for the file in which the read stream associated with the generated set of readahead
12 metadata is established;
13   receiving a client read request at the storage system, the client read request
14 indicating client-requested data for the storage operating system to retrieve from a file,
15 stored in the storage system;
16   determining whether the received client read request matches any of a plurality of
17 readsets allocated for the file containing the client-requested data; and
18   performing readahead operations in accordance with a set of readahead metadata
19 stored in a readset that is determined to match the received client read request.

1   32. (New) The method of claim 31, wherein the file is broad term describing either a file,
2   directory, vdisk or lun.

1   33. (New) The method of claim 31, further comprising:
2   initializing each allocated readset to store a predetermined set of values.

1   34. (New) The method of claim 31, wherein the number of readsets allocated for a file is
2   dynamically increased as the size of that file is increased.

1   35. (New) The method of claim 31, wherein a first readset is determined to match the

2   received client read request if the first readset stores a set of readahead metadata

3   associated with a read stream that is extended by the client-requested data.

1   36. (New) The method of claim 31, wherein a second readset is determined to match the

2   received client read request when the client-requested data is located within a

3   predetermined fuzzy range associated with the second readset.

1   37. (New) The method of claim 36, wherein the fuzzy range is derived based on a

2   multiple of a number of client-requested data blocks specified in the received client read

3   request.

1   38. (New) The method of claim 36, wherein the fuzzy range extends in both a forward

2   direction and a backward direction in relation to a last data block retrieved in a read

3   stream associated with the second readset.

1   39. (New) The method of claim 31, wherein a third readset is determined to match the

2   received client read request if the third readset is determined to be unused.

1   40. (New) The method of claim 39, wherein the third readset is determined to be unused

2   when a level value stored in the third readset equals a special indicator value.

1   41. (New) The method of claim 31, wherein readahead operations are not performed if

2   the storage operating system determines that the file, directory, vdisk or lun containing

3   the client-requested data is accessed using a random access style.

1   42. (New) The method of claim 41, wherein a DAFS cache hint included in the received

2   client read request indicates that the file, directory, vdisk or lun containing the client-

3   requested data is accessed using a random access style.

1　43. (New) The method of claim 31, wherein readahead operations are not performed

2　　　　unless:

3　　　　　　　　(i)　a readset is determined to match the received client read request; and

4　　　　　　　　(ii)　the matching readset stores a set of readahead metadata associated

5　　　　with a read stream that is extended by the client-requested data past a

6　　　　predetermined data block or memory address.

1　44. (New) The method of claim 31, further comprising:

2　　　　if the received client read request does not match any of the readsets allocated for

3　the file, directory, vdisk or lun containing the client-requested data, then performing the

4　steps:

5　　　　　　　identifying the received client read request as being the first read

6　　　　　　request in a new read stream;

7　　　　　　　generating a set of readahead metadata associated with the new

8　　　　　read stream;

9　　　　　　　selecting for reuse one of the readsets allocated for the file,

10　　　　directory, vdisk or lun containing the client-requested data; and

11　　　　　　　storing the generated set of readahead metadata associated with the

12　　　　new read stream in the readset selected for reuse.

1　45. (New) The method of claim 44, wherein the readset selected for reuse stores a level

2　value that is less than or equal to level values stored in each of the other readsets

3　associated with the file, directory, vdisk or lun containing the client-requested data.

1　46. (New) The method of claim 31, wherein the client read request received at the storage

2　system is a file-based client read request.

1　47. (New) The method of claim 31, wherein the client read request received at the storage

2　system is a block-based client read request.

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